Impact Statement (DOE/EIS-0303D) in November 2000. DOE held public meetings on the Draft Environmental Impact Statement in North Augusta, South Carolina, on January 9, 2001, and in Columbia, South Carolina, on January 11, 2001. The public comment period ended on January 23, 2001. DOE received 18 letters on the Draft EIS. Court reporters documented comments and statements made during two public meetings, at which eight EC individuals asked questions, provided comments, or made statements. These comments have been addressed in the Final EIS and the comments, along with DOE's responses, are given in Appendix D of this EIS. The major points and DOE's responses are discussed at the end of this Summary.

S.4 Purpose and Need

DOE needs to reduce human health and safety risks at and near the HLW tanks, and to reduce the eventual introduction of contaminants into the environment. If DOE does not take action after bulk waste removal, the tanks would fail and contaminants would be released to the environment. Failed tanks would present the risk of accidents to individuals and could lead to L-2-9 surface subsidence, which could open the tanks L-2-4 to intrusion by water or plants and animals. Release of contaminants to the environment would present human health risks, particularly to individuals who might use contaminated water, in addition to adverse impacts to the environment.

S.5 Decisions to be Based on This EIS

This EIS provides an evaluation of the environmental impacts of several alternatives for closure of the HLW tanks at SRS. The closure process will take place over a period of up to 30 years. The EIS provides the decision makers with an assessment of the environmental, health, and safety effects of each alternative. The selection of one or more tank closure TC alternatives, following completion of this EIS, will guide the selection and implementation of a closure method for each HLW tank at SRS. Within the framework of the selected alternative(s), and the environmental impact of TC closure described in the EIS, DOE will select and implement a specific closure method for each tank.

In addition to the closure methods and impacts described in this EIS, the tank closure program will operate under a number of laws, regulations, and regulatory agreements. In addition to the General Closure Plan (a document prepared by DOE and based on responsibilities under the AEA and other laws and regulations and approved by SCDHEC), the closure of individual tanks will be performed in accordance with a tank-specific Closure Module. Each Closure Module will incorporate a specific plan for tank closure and modeling of impacts based on that plan. Through the process of preparing and approving each Closure Module, DOE will select a closure method that is consistent with the alternative(s) selected after completion of this EIS. The aggregate environmental impacts TC of closing all the tanks would be equal to or less than those described in this EIS.

During the expected 30-year period of tank closure activities, new technologies for tank cleaning or other aspects of the closure process may become available. In a tank-specific Closure Module, DOE would evaluate the technical, regulatory, and performance TC implications of any new technology.

S.6 Proposed Action and Alternatives

DOE proposes to close the HLW tanks at SRS in accordance with applicable laws and regulations, DOE Orders, and the *Industrial Wastewater Closure Plan for F- and H-Area High-Level Waste Tank Systems* approved by SCDHEC, which specifies the management of residuals as waste incidental to reprocessing. The proposed action evaluated in this EIS would begin when bulk waste removal has been completed. Under each alternative except No Action, DOE would close 49 HLW tanks and associated waste handling equipment including evaporators, pumps, diversion boxes, and transfer lines.

DOE is evaluating three alternatives in this EIS.

Tank Closure Alternatives

Implementation of each alternative would start following bulk waste removal and SCDHEC approval of a tank-specific Closure Module that is protective of human health and the environment.

- Fill the tanks with grout (Preferred Alternative). The use of sand or saltstone as fill material would also be considered.
- Clean and remove the tanks for disposal in the SRS waste management facilities.
- No Action. Leave the tank systems in place without cleaning or stabilizing, following bulk waste removal.

S.6.1 STABILIZE TANKS ALTERNATIVE

In the Draft EIS this Alternative was called the Clean and Stabilize Tanks Alternative. In order to provide flexibility for the closure process, DOE has changed the name to the Stabilize Tanks Alternative. If bulk waste removal is effective in removing waste from the tanks to the extent that performance objectives could be met and the Waste Incidental to Reprocessing process could be completed, DOE would not spray water wash the tanks, or use enhanced cleaning methods. A decision to forego cleaning would require the agreement of the SCDHEC in the form of an approved tank closure module.

Following bulk waste removal, DOE would clean the tanks, if necessary, to meet the performance objectives and fill the tanks with a material that would bind up remaining residual waste and prevent future collapse of the tanks. DOE considers three options for tank stabilization under this alternative:

- Fill with Grout (Preferred Alternative)
- Fill with Sand
- Fill with Saltstone

In the evaluation phase of tank closure, each tank system or group of tank systems would be evaluated to determine the inventory of radiological and nonradiological contaminants remaining after bulk waste removal. This information would be used to conduct a performance evaluation as part of the preparation of a Closure Module. In the evaluation DOE would consider: (1) the types of contamination in the tank and the configuration of the tank system, and (2) the hydrogeologic conditions at and near the tank location, such as distance from the water table and distance to nearby streams. The performance evaluation would include modeling the projected contamination pathways for selected closure methods, and comparing the modeling results with the performance objectives developed in the General Closure Plan. If the modeling shows that performance objectives would be met, the Closure Module would be submitted to SCDHEC for approval.

If the modeling shows that the performance objectives would not be met, cleaning steps (such as spray water washing or oxalic acid cleaning) would be taken until sufficient waste had been removed such that the performance objectives could be met.

<u>Tank Stabilization</u>

After DOE determines the nature and amount of residual waste, and demonstrates that the performance objectives would be met, SCDHEC would approve a Closure Module. The tank stabilization process would then begin. Each tank system (including the secondary containment, for those that have it) would be filled with a pumpable, self-leveling backfill material. DOE's preferred option is to use grout, a concrete-like material, as backfill. The grout would be trucked to an area near the tank farm, batched if necessary, and pumped to the tank. The fill material would be high enough in pH to be compatible with the carbon steel walls of the waste tank. The grout would be formulated with chemical properties that would retard the movement of radionuclides in the residual waste in the closed tank. Therefore, the closure configuration for each tank or group of tanks would be determined on a case-by-case basis through development of the Closure Module.

Using the preferred option of grout as fill material, the grout would be poured in three distinct layers as illustrated in Figure S-6. The bottom-most layer would be a specially formulated reducing grout to retard the migration of important contaminants and which TC provides some mixing and encapsulation of the residual material. The middle layer would be a low-strength material designed to fill most of the volume of the tank interior. The final layer would be a high-strength grout to deter inadvertent intrusion from drilling. DOE is also considering an all-in-one grout that would provide the same performance as the three TC separate layers of grout. If this all-in-one grout provides the same performance and protection at a lesser cost, DOE may choose to use the all-in-one grout.

If DOE were to choose another fill material (sand or saltstone) for a tank system, all other aspects of the closure process would remain the same, as described above.

Sand is readily available and inexpensive. Its emplacement is more difficult than grout because it does not flow readily into voids. Any equipment or piping left on or inside the tank that might require filling (to eliminate voids inside the device) might not be adequately filled. Over time, the sand would tend to settle in the tank, creating additional void spaces. The dome of the tank would then become unsupported and would sag and crack. The sand would tend to isolate the contamination from the environment to some extent, limit the amount of settling of the tank top after failure, and prevent wind from spreading the contaminants. Nevertheless, water would flow readily through the sand. Sand is relatively inert and could not be formulated to retard the migration of radionuclides. Thus, expected contamination levels in groundwater and surface water streams resulting from migration of residual contaminants would be higher than the levels for the preferred option.

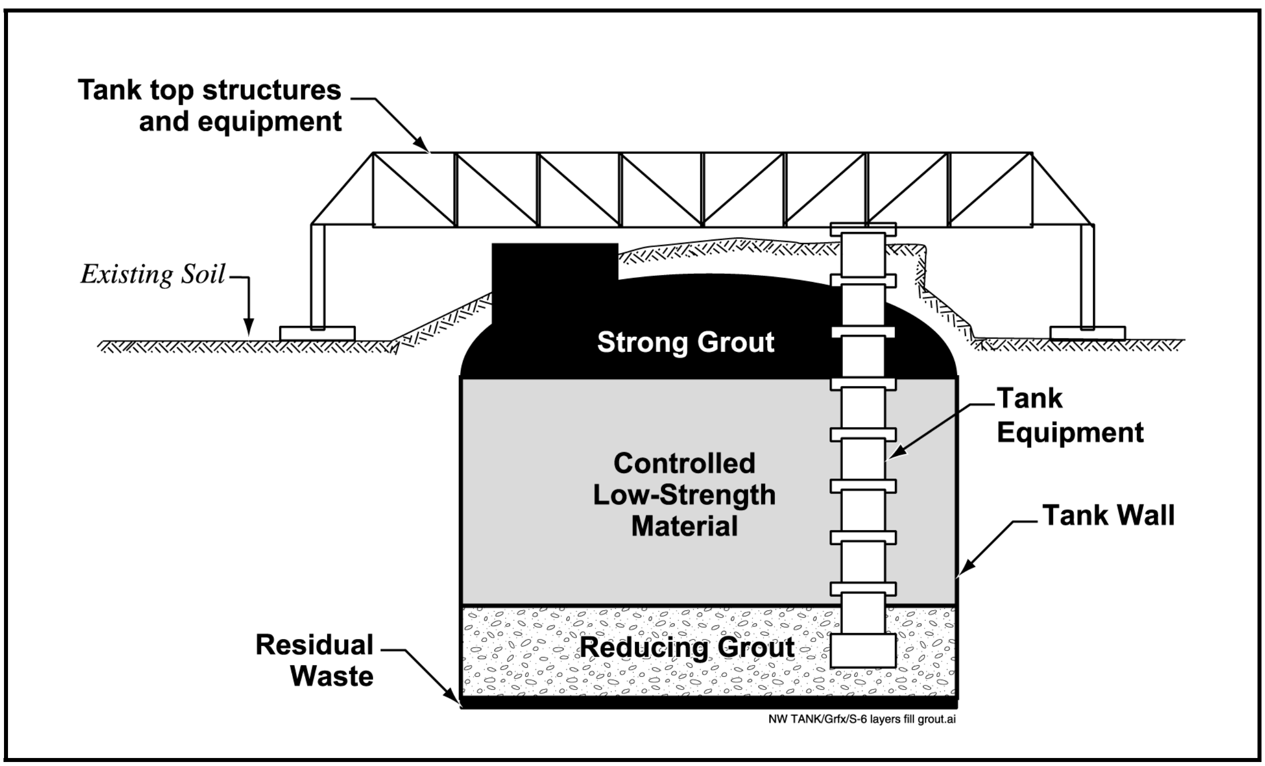

Figure S-6. Typical layers of the Fill with Grout Option.

Saltstone could also be used as fill material. Saltstone is the low-radioactivity fraction mixed with cement, flyash, and slag to form a concrete-like mixture. Saltstone is normally disposed of as LLW in the SRS Saltstone Disposal Facility. This alternative would have the advantage of reducing the amount of Saltstone Disposal Facility area that would be required and reducing the time and cost of transporting the material to the Saltstone Manufacturing Facility. Filling the tank with a grout mixture that is contaminated with radionuclides, like saltstone, would considerably complicate the project and increase worker radiation exposure, which would increase risk to workers and add to the cost of closure. In addition, the saltstone would contain large quantities of nitrate that would not be present in the tank residual. Because nitrates are very mobile in the environment, these large quantities of nitrate would adversely impact the groundwater near the tank farms over the long term (i.e., nitrate concentrations could exceed the SCDHEC Maximum Contaminant Level).

Following the use of any of the stabilization options described above, four tanks in F Area and four tanks in H Area would require backfill soil to be placed over the top of the tanks. The back-fill soil would bring the ground surface at these tanks up to the surrounding surface elevations to prevent water from collecting in the surface depressions. This action would prevent ponding conditions over the tanks that could facilitate degradation of the tank structure.

S.6.2 CLEAN AND REMOVE TANKS ALTERNATIVE

The Clean and Remove Tanks Alternative would include cleaning the tanks, cutting them up in situ, removing them from the ground, and transporting tank components for disposal in an engineered disposal facility at another location on SRS. This alternative has not been demonstrated on HLW tanks.

For the Clean and Remove Tanks Alternative, DOE would have to perform enhanced cleaning until tanks were clean enough to be safely removed and could meet waste acceptance criteria at SRS Low-Level Waste Disposal Facilities. Worker exposure would have to be As Low As Reasonably Achievable to ensure protection of the individuals required to perform the tank removal operations. This might require the use of cleaning technologies such as oxalic acid cleaning, mechanical cleaning, and additional steps as yet undefined on most of the tanks. DOE considers that these actions on so many tanks would not likely be “technically and economically practical” within the meaning of DOE Order 435.1 because of additional criticality safety concerns associated with acidic cleaning solutions, potential interference with downstream waste processing activities, large worker radiation exposures, and high cost.

Following bulk waste removal and cleaning, the steel components of the tank would be cut up, removed, placed in radioactive waste transport containers (approximately 3,900 SRS LLW disposal boxes per tank), and transported to SRS radioactive waste disposal facilities for disposal. During cutting and removal operations, steps would be taken and technologies employed to limit both emissions and exposure of workers to radiation. This alternative would require the construction of approximately 16 new low-activity waste vaults at SRS for disposal of the tank components. This alternative has the advantage of allowing disposal of the contaminated tank system in a waste management facility that is already approved for receiving LLW.

With removal of the tanks, backfilling of the excavations left after the removal would be required. The backfill material would consist of a soil type similar to the soils currently surrounding the tanks.

S.6.3 NO ACTION ALTERNATIVE

For HLW tanks, the No Action Alternative would involve leaving the tank systems in place after bulk waste removal has taken place. Even after bulk waste removal, each tank would contain residual waste and, in those tanks that reside in the water table, ballast water. The tanks would not be backfilled.

After some period of time (probably hundreds of years), the reinforcing bar in the roof of the tank would rust and the roof would fail, causing the structural integrity to degrade. Similarly, the floor and walls of the tank would degrade over time. Rainwater would pour into the exposed tank, flushing contaminants from the residual waste in the tanks and eventually carrying these contaminants into the groundwater. Contamination of the groundwater would occur much more quickly than it would if the tank were backfilled and the residual waste bound with the backfill material.

S.7 Alternatives Considered, But Not Analyzed

S.7.1 MANAGEMENT OF TANK RESIDUALS AS HIGH-LEVEL WASTE

The alternative of managing the tank residuals as HLW is not appropriate, in light of the provisions of DOE Order 435.1 and the State-approved General Closure Plan for a regulatory approach based on the determination that the residuals can be managed as other than HLW through the Waste Incidental to Reprocessing Process, as discussed in Section S.2.4.

The waste incidental to reprocessing designation does not create a new radioactive waste type. The terms "incidental waste" or "waste incidental to reprocessing" refer to a process for identifying waste streams that might otherwise be considered HLW due to their origin, but can be managed as LLW or transuranic waste, if the waste incidental to reprocessing requirements contained in DOE Manual 435.1-1 are met. The goal of the waste incidental to reprocessing determination process is to safely manage a limited number of reprocessing waste streams that do not warrant geologic repository disposal because of their low threat to human health or the environment. Although the technical alternatives of managing tank residuals under the General Closure Plan would likely be the same as those that would apply to managing residuals as HLW, the application of regulatory requirements would be different.

As described in the General Closure Plan, DOE will determine whether the residual waste meets the waste incidental to reprocessing requirements of DOE Manual 435.1-1, which entail a step for removing key radionuclides to the extent that is technically and economically practical, a step for incorporating the residues into a solid form, and a process for demonstrating that appropriate disposal performance objectives are met. The technical alternatives evaluated in the EIS represent a range of stabilization and tank cleaning techniques. The radionuclides in residual waste would be the same whether the material is classified as HLW, LLW, or transuranic waste; however, the regulatory regime would be different.

DOE must demonstrate its ability to meet certain performance objectives before SCDHEC will approve a Closure Module. Appendix C of the General Closure Plan describes the process DOE used to determine the performance objectives (dose limits and concentrations established to be protective of human health) incorporated in the General Closure Plan. As described in Chapter 7 of this EIS, DOE will establish performance objectives for the closure of each HLW tank. In the General Closure Plan, DOE considered dose limits and concentrations found in HLW management requirements (40 CFR 191 and 197, 10 CFR 60 and 63) in defining the overall performance standard. DOE considered the HLW management dose limits and concentrations as performance indicators of the ability to protect human health and the environment, even though the residual would not be considered HLW. That evaluation (described in Appendix C of the General Closure Plan) identified numerical performance standards (concentrations or dose limits for specific radiological or chemical constituents released to the environment) based on the requirements and guidance. Those numerical standards apply to all exposure pathways and to specific media (air, groundwater, and surface water) at different points of compliance and over various periods during and after closure.

If DOE determines through the waste incidental to reprocessing process, discussed in Section S.2.4, that the tank residues cannot be managed as expected, as LLW, or alternatively